

Name: _____

at1119paper: Complete the Square, $b = \text{odd}$ (v515)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 55x = -414$$

Add $\left(\frac{-55}{2}\right)^2$, which equals $\frac{3025}{4}$, to both sides of the equation.

$$x^2 - 55x + \frac{3025}{4} = \frac{1369}{4}$$

Factor the left side.

$$\left(x + \frac{-55}{2}\right)^2 = \frac{1369}{4}$$

Undo the squaring.

$$\begin{aligned} x + \frac{-55}{2} &= \frac{-37}{2} \\ x &= \frac{55 - 37}{2} \\ x &= 9 \end{aligned}$$

$$\begin{aligned} \text{or} \\ x &+ \frac{-55}{2} = \frac{37}{2} \\ x &= \frac{55 + 37}{2} \\ x &= 46 \end{aligned}$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 49x = -418$$

$$\begin{aligned} x^2 - 49x + \frac{2401}{4} &= \frac{729}{4} \\ \left(x + \frac{-49}{2}\right)^2 &= \frac{729}{4} \end{aligned}$$

$$\begin{aligned} x + \frac{-49}{2} &= \frac{-27}{2} \\ x &= \frac{49 - 27}{2} \\ x &= 11 \end{aligned}$$

$$\begin{aligned} \text{or} \\ x &+ \frac{-49}{2} = \frac{27}{2} \\ x &= \frac{49 + 27}{2} \\ x &= 38 \end{aligned}$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 61x = 2492$$

$$x^2 - 61x + \frac{3721}{4} = \frac{13689}{4}$$

$$\left(x + \frac{-61}{2}\right)^2 = \frac{13689}{4}$$

$$x + \frac{-61}{2} = \frac{-117}{2}$$

or

$$x + \frac{-61}{2} = \frac{117}{2}$$

$$x = \frac{61 - 117}{2}$$

or

$$x = \frac{61 + 117}{2}$$

$$x = -28$$

or

$$x = 89$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 31x = 180$$

$$x^2 - 31x + \frac{961}{4} = \frac{1681}{4}$$

$$\left(x + \frac{-31}{2}\right)^2 = \frac{1681}{4}$$

$$x + \frac{-31}{2} = \frac{-41}{2}$$

or

$$x + \frac{-31}{2} = \frac{41}{2}$$

$$x = \frac{31 - 41}{2}$$

or

$$x = \frac{31 + 41}{2}$$

$$x = -5$$

or

$$x = 36$$